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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/749,668 | 12/30/2003 | Theodore S. Moise IV | TI-36398 | 9759 |

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| EXAMINER |
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KALAM, ABUL

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| ART UNIT | PAPER NUMBER |
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2814

DATE MAILED: 08/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/749,668

Applicant(s)

MOISE ET AL.

Examiner

Abul Kalam

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 7-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/18/06
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Status

Claims 1-6 were amended and claims 7-20 were withdrawn in the response filed by the Applicant on May 15, 2006.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. **Claims 1-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Fox et al. (6,627,930; cited in previous office action)** in view of **Uchiyama et al. (US 6,831,313; cited in previous office action)**.

With respect to **claim 1**, **Fox** teaches an integrated circuit (col. 6, lines 29-37) including:

An array of ferroelectric memory cells (col. 6, line 29-37), each cell having a capacitor stack (20₂) having a ferroelectric core (22 and 24) with a crystallization in the (001) family, the ferroelectric cores having asymmetric domains, wherein at least about 40% of the domains are functionally oriented with respect to the capacitor stack (Fig. 2B).

Regarding the claimed "crystallization in the (001) family," **Fox** discloses in figure 2B a main body (22) of <001> crystallographic texture.

Regarding the claimed “at least about 40% of the domains are functionally oriented with respect to the capacitor stack,” **Fox** discloses that the second ferroelectric layer (24) is substantially 25% or less of a total thickness of the ferroelectric dielectric layer (col. 8, lines 5-6). Therefore, if the second layer of the ferroelectric core is 25% (“substantially 25% or less”) of the total thickness, then the main body (22), with an orientation of <001>, is 75% of the total thickness. Thus, 75% of the domains are functionally oriented with respect to the capacitor stack (Fig. 2B), since the applicant defines functionally oriented domains to mean a polarization vector parallel to the ferroelectric capacitor.

Furthermore, note that the specification contains no disclosure of either the *critical nature of the claimed*, “at least 40% of the domains are functionally oriented with respect to the capacitor stack,” or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Thus, **Fox** teaches all the limitations of the claim with the exception of disclosing: wherein at least one of the capacitor stack comprises a conductive contact formed thereover or thereunder, or both, and wherein the conductive contact has a cross section near a contact portion with the top portion of the stack, the bottom portion of the stack, or both, that is about as large or larger than that of the ferroelectric cores.

However, **Uchiyama** teaches an array of ferroelectric memory cells (**FIGS. 5 and 9**) in which a ferroelectric capacitor stack (**128**) has a conductive contact (**139**) formed

thereover and wherein the conductive contact has a cross section near a contact portion with the top portion of the stack (**126**), that is about as large or larger than that of the ferroelectric cores (**124**) (**col. 9, Ins. 24-67; col. 10, Ins. 1-19**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the integrated circuit of **Fox** with the teaching of **Uchiyama**, for the well known purpose of providing reliable interconnections between active components in an integrated circuit.

With respect to **claim 2**, **Fox** and **Uchiyama** teach the integrated circuit of claim 1 above. Furthermore, **Fox** teaches wherein from about 45 to about 75% of the domains are functionally oriented with respect to the capacitor stack.

In figure 2B, the second layer (24) of the ferroelectric core is 25% (col. 8, lines 5-6), and the main body (22), with an orientation of <001>, is 75%, and thus 75% of the domains are functionally oriented with respect to the capacitor stack (Fig. 2B).

Furthermore, note that the specification contains no disclosure of either the *critical nature of the claimed*, "about 45 to about 75% of the domains are functionally oriented with respect to the capacitor stack," or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to **claim 3, Fox and Uchiyama** teach the integrated circuit of claim 1 above. Furthermore, **Fox** teaches wherein the ferroelectric cores are PZT cores (**col. 6, lines 9-37**).

Regarding the limitation, "the PZT of each core has a switched polarization of at least about $60 \mu\text{C}/\text{cm}^2$," the specification contains no disclosure of either the *critical nature of the claimed*, "switched polarization of at least about $60 \mu\text{C}/\text{cm}^2$," or any unexpected results arising therefrom. Where patentability is aid to base upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to **claim 4, Fox and Uchiyama** teach the integrated circuit of claim 1 above. Furthermore, **Uchiyama** teaches a dielectric layer covering (**142**) the array of memory cells (**100**), the dielectric layer having a conductive contact (**139**) over each ferroelectric core (**124**), the conductive contacts each having a cross section about as larger or larger than that of the ferroelectric cores (**FIG. 5; col. 10, Ins. 9-19; col. 11, Ins. 38-43**).

With respect to **claim 5, Fox and Uchiyama** teach the integrated circuit of claim 1 above. Furthermore, **Uchiyama** teaches electrodes (**122, 126**) adjacent opposing sides of the ferroelectric cores (**124**) (**col. 9, Ins. 49-62**).

Regarding the limitation, "electrodes adjacent opposing sides of the ferroelectric cores have a collective thickness of at least about 200 nm thick," the specification contains no disclosure of either the *critical nature of the claimed*, "collective thickness of

at least about 200 nm," or any unexpected results arising therefrom. Where patentability is aid to base upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to **claim 6**, **Fox and Uchiyama** teach the integrated circuit of claim 1 above. Furthermore, **Uchiyama** teaches wherein each of the capacitor stacks are formed over conductive contacts (**120**), the conductive contacts having a cross section near their top that is about as large or larger than that of the ferroelectric cores (**124**) (**FIG. 5; col. 9, Ins. 40-62; col. 11, Ins. 38-43**).

Response to Arguments

Applicant's arguments with respect to claims 1-6 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not


mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is 571-272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Abul Kalam
Examiner
Art Unit 2814


ANH D. MAI
PRIMARY EXAMINER